essential features of an American foxhound, while among pointers (which are special favourites in America) and setters a greater proportion of energy to weight is the feature at which the breeder aims. The admirable reproductions from photographs with which the excellent little volume is illustrated fully bear out the author's statement as to the marked physical differences of the dogs he describes from their European prototypes. R. L.

Histoire de l'Habillement et de Parure. Bibliothèque scientifique internationale. By Louis Bourdeau. Pp. 302. (Paris: Félix Alcan, 1904.) Price 6 francs.

THE history of clothing and of ornaments is an important aspect of the history of culture, and it well deserves independent treatment. M. Bourdeau deals with the primitive articles of clothing, skins, natural vegetable products and the like, the method of working these, and the fabrication of textiles and the methods of colouring them. The making and wearing of clothes are briefly noted with the history of costumes, in which are included dressing the hair, head, hand and foot gear, umbrellas and jewellery. The scheme is good enough, but, as the work is confined to 299 pages, the treatment is necessarily slight, for the author begins with Genesis, quotes Greek and Roman authors, and, glancing at intermediate periods, finishes with modern industrialism, making allusions by the way to non-European peoples of varied culture.

The book can be recommended to those who require a light, popular sketch of the history of clothing—the serious student will, however, be disappointed. The author's knowledge of ethnology appears to be extremely limited, judging from the imperfect statements in, and the omissions from the book; for example, the paper mulberry tree is not mentioned; he is unaware of the practice of the Roman Catholic women of Bosnia and Herzegovina to tattoo themselves so as to be further discriminated from the followers of Islam; like most other writers, he does not distinguish between the Maori *moko* and ordinary tattooing. No mention is made of the production of patterns in cotton fabrics by tightly tying several strands of a warp in different places and then dyeing the whole, which technique is carried to a high degree of excellence by many Malayan peoples; nor is the analogous method of waxing fabrics and dyeing the unwaxed portions referred to. Melanesians are confounded with Polynesians (p. 229), an error as great as speaking of Negroes as Europeans. But it is in the section on ornaments that the author is weakest. It is now well recognised that what are generally spoken of as "ornaments" are worn by nature-folk and by barbarians for magical purposes as prophylactics to ward off evil, to ensure good luck generally, or to produce some definite result. This aspect is entirely ignored by M. Bourdeau. Many "ornaments" have the value of currency, but probably very few are worn solely for purposes of adornment. There are no illustrations, and, as is usual with this class of book, there is no index.

The Ether: Some Notes on its Place in Nature. By John Rhind. Pp. viii+87. (Wick: W. Roe, 1904.)

LIKE the mythical Dog Diamond, Mr. Rhind little knows what mischief he is doing. If his amendments of accepted beliefs were adopted, the well built doctrine of science would become no better than

> "a tale told by an idiot,
> "Full of sound and fury, signifying nothing."

Mr. Rhind's knowledge of principles goes no deeper, apparently, than the most popular utterances of popular lecturers and writers, and these are subject to amendment *ad libitum* to square with "common sense." With this slender equipment he does not falter to lay violent hands upon the theory of gravitation, the conservation of matter, and the nebular hypothesis.

A single example (p. 45) of the method will suffice:—"We would suggest that the earth may have the power of converting, or in other words of condensing, the ether into oxygen, which is the principal agent in sustaining life. The sun's atmosphere being so much more powerful, will be able to condense this element into an electric fluid which, being sent to his planets, gives them light and heat, and in combination with the oxygen of our earth and its atmosphere completes the power, if not of introducing life, of maintaining the life that already exists on our globe." It seems that (p. 48) "ether, oxygen and the electric fluid are only different manifestations of the same substance." The moral of the book appears to be that if science were adequately taught us at school, a gentleman with an active and spontaneous interest in natural phenomena need not in after life go so pitifully astray.

A Safe Course in Experimental Chemistry. By W. T. Boone. University Tutorial Series. Pp. vi+180. (London: W. B. Clive, 1904.) Price 2*s*.

THIS little volume is quite up to the standard of the best of modern elementary books on practical chemistry. It clearly embodies the experience of a thoughtful teacher who has made his students work and think accurately, and is not without originality of treatment in the arrangement and character of the exercises.

It has the fault of all experimental books which ignore the presence of the teacher, inasmuch as it is forced to supply wordy and involved descriptions of such simple operations as, for example, removing a stopper when using a stoppered bottle, which a demonstration would make clear in a moment.

One of the "rules for a chemical laboratory" laid down at the beginning of the book—"do not use more of a reagent than is necessary"—raises an obvious question which might be difficult to answer at this early stage, and is rather like telling a child not to eat too much.

The use of the word "safe" in the title conveys a flavour of quackery, which is a little unfortunate in a book of much solid merit. The illustrations serve their purpose, no doubt, but the handiwork of the amateur is a little too evident.

Apart from these few criticisms, the book, as already stated, deserves a good reception. J. B. C.

Catalogue of British Coleoptera. By T. Hudson Beare, B.Sc., and H. St. J. K. Donisthorpe, F.Z.S. Pp. 51. (London: Janson, 1904.)

THIS is one of the lists which are imperatively required by students of British entomology to keep them informed from time to time as to what species are actually considered by good authorities to be found in these islands, genuine additions being allowed for, and doubtful records eliminated. The print is clear and good, and another edition on stout paper, and printed on one side only, to be used for labels or notes, has been issued. The authors' names are a sufficient guarantee for the care and accuracy with which they have apparently done their work. The list contains 3274 species admitted as indigenous, and there are supplementary lists of introduced or doubtful species. The introduced list is headed by two very conspicuous species, which, though not unfrequently taken in England, can hardly be considered indigenous. These are *Carabus auratus* (often introduced with vegetables, &c.) and *Calosoma sycophanta*.

The last critical list of British beetles, by Sharp and Fowler, was published eleven years ago, and we heartily recommend the present list to British entomologists.

A Preliminary Course of Practical Physics. By C. E. Ashford, M.A. Pp. 48. (London: Edward Arnold, 1904.) Price 1s. 6d.

THIS little book on practical physics is of a kind familiar to teachers of the subject. The experiments are simple and well within the power of schoolboys, but so far as we have examined them they differ little from those to be found in well known books. Indeed, in his preface the author says it is impossible adequately to acknowledge the debt "to those from whose books many of the experiments have been derived." But though the book contains much in common with previously published first courses of practical physics, the author has compiled a logical and useful manual of experiments which will serve to introduce boys to the study of physical science. The volume may be recommended to the attention of teachers deciding upon a book to place in the hands of their pupils.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

On the Radio-activity of Natural Gas.

IN a paper by Mr. E. F. Burton, recently published in the *University of Toronto Studies, Physical Science Series,* an account is given of some experiments with a highly radio-active gas obtained from crude petroleum. In this investigation it was found that air drawn through crude petroleum became charged with a radio-active emanation which, from the rate at which its activity decayed and from the nature of the induced radio-activity which it produced, the author concluded to be an emanation from radium.

The present writer has extended this investigation to an examination of the natural gas from different wells in western Ontario. The gas from every well examined, which included those in the Welland district, in the neighbourhood of Niagara Falls, as well as those near the city of Brantford, was found to be charged with a radio-active emanation. The activity of this emanation in all the gases tested was found to decay or die out to one-half its original intensity in about three days, and the intensity of the induced radio-activity which it produced died down to one-half value in about forty minutes.

The wells examined varied in their depths, but the amount of active emanation present was found to be practically the same in all wells coming from the same horizon. In the Welland district, the gas from those wells which had their source in the stratum known as the Niagara formation, and which were about 500 feet deep, possessed the highest initial conductivity. On an arbitrary scale this conductivity is represented by about 2000

The gas of those wells which had their source in the Clinton limestone, 750 feet deep, possessed an initial conductivity of about 300 on the same scale, while that from wells coming from the Medina formation, about 900 feet deep, gave an initial conductivity of about 1200. One well, which had its source in the Trenton limestone, and had a depth of about 3000 feet, possessed an initial conductivity of about 200. The highest conductivity obtained in the investigation was that of the gas from a well near the city of Brantford, the conductivity in this case being about 9000. An investigation of this gas showed that, under the action of the emanation with which it was charged, there was produced, at normal pressure, about 15,000 ions per second in each cubic centimetre of its mass.

A test made on the conductivity of ordinary air, confined at atmospheric pressure in the receiver used in making the measurements on the conductivity of the different samples of natural gas, showed a production of 32 ions per cubic centimetre per second. J. C. MCLENNAN.

University of Toronto, May 28.

The Source of Radio-active Energy.

IN NATURE of June 2, Mr. Jeans brings forward the view that the energy manifested in radio-active processes is derived from the coalescence of positive and negative ions, thus involving an annihilation of matter. For some time it has seemed to me that some such fundamental change is needed to account for the observed phenomena, and I therefore venture to submit some general and numerical considerations bearing on this view.

Mr. Jeans is inclined (as I understand) to attribute the beginnings of the process to a change of type in advancing æthereal waves, arising from a lack of strict linearity in the equations of the electromagnetic field. It may be pointed out, however, that whether or not the circumstances of æthereal wave-propagation are strictly expressible by linear equations, there is a *universal tendency* towards loss of kinetic energy in orbitally moving systems of electrons. Unless the orbital periods are very long compared with the time taken by radiation to traverse the assemblage, there must be appreciable radiation of energy, and it is thus a necessary condition of permanence or quasi-permanence that *the orbital velocities should be very small compared with the velocity of light.* This view is confirmed by numerical consideration of simple cases in which the orbits are assumed to be of *atomic* dimensions; it is also borne out by the general optical properties of matter.

It should be remarked that as energy is dissipated and orbits become contracted, with corresponding rise of velocities, the total effective radiation will become more and more intense, so that conceivably very little time may be occupied in the transition from a quasi-permanent motion to a state of collapse and disintegration; indeed, once the orbital motions have begun to give out perceptible radiation, the life of the system must be excessively short.

Thus, whether we look for the main source of radio-active energy in enormous orbital velocities due to intra-atomic rearrangement, or in the constitutive electrostatic energy of individual electrons set free by mutual annihilations, the conditions favourable to radio-activity in any given atom must be confined to a momentary phase—momentary, that is, as measured by ordinary standards. It is not a long step from this conclusion to an exponential law of decay of radio-active matter.

If we adopt provisionally Dr. H. A. Wilson's very interesting suggestion (NATURE, June 2) that, the positive and negative electrons having numerically equal charges, the greater mass of the positive electron is due to its smaller diameter, it follows that *any* isolated electron has electrostatic energy $=\frac{1}{2}m.3V^2$, where m is the mass of the electron (when moving slowly) and V is the velocity of light. In other words, when matter of mass M is annihilated, energy $=\frac{1}{2}M.3V^2$ is set free—initially as an electromagnetic pulse of great intensity. *A further assumption involved in this estimate is the validity of the ordinary electrostatic-field relations for such enormous intensities as obtain in the neighbourhood of an electron.*

If annihilation of matter furnishes the energy of radio-activity, it follows from our estimate that, in the case of radium, the coalescence of one pair of electrons causes the break-up of a large number of radium atoms (something of the order of one hundred), otherwise the total energy emitted by radium would be much greater than that which has been observed by Curie and Laborde.

If the assumption in italics above is very wide of the mark (which is conceivable), our estimate of the energy of annihilation is probably in excess.

It may be supposed that some neighbouring atoms, which are not actually broken up by the pulse arising from a pair of coalescing electrons, receive a sufficient access of kinetic energy to *prolong* their existence. "Metabolons" of short average life may be conceived of as consisting of assemblages the orbital motions of which are especially liable to be damped out rapidly by radiation of energy.

Cambridge, June 9. C. V. BURTON.